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**Relationships between teachers and disruptive children in kindergarten : an exploration of different methods and perspectives, and the possibility of change**

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### **3 Teachers' assessment of physical aggression with the Preschool Behavior Questionnaire: A multi-trait multi-method evaluation of convergent and discriminant validity\***

The distinctiveness of physical aggression from other antisocial behavior is widely accepted but little research has explicitly focused on young children to empirically test this assumption. The purpose of this study was to confirm the discrimination of physical aggression from nonaggressive antisocial behavior in early childhood using a multi-trait multi-method framework. We investigated the discriminant and convergent validity of teacher reports of physical aggression on a measure that contained age-appropriate behavior items selected from the Preschool Behavior Questionnaire (PBQ). Assessments of physical aggression versus nonaggressive antisocial behavior of 117 kindergartners with different behavior profiles were obtained using three measures varying in source and/or method: 1) teacher reports on the PBQ, 2) short interviews with teachers, and 3) classroom observations. The MTMM matrix was analyzed using confirmatory factor analysis (CFA). The results provided reasonable support for the discrimination between physical aggression and nonaggressive antisocial behavior. In addition, strong support was found for the convergent validity of teacher-rated physical aggression using PBQ items.

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### **3.1 Introduction**

It is widely accepted and empirically supported that physical aggression is a separate dimension of antisocial behavior (e.g., Cote, Vaillancourt, LeBlanc, Nagin, & Tremblay, 2006; Loeber & Hay, 1997; Nagin & Tremblay, 1999; NICHD Early Child Care Research Network, 2004). However, evidence for the assumption that physical aggression is distinctive from more generic antisocial behavior is mainly limited to middle and late childhood, while little research has explicitly focused on early childhood (for a review, see Moreland & Dumas, 2008). Scholars repeatedly noted that, in this age range, available measures often confound physical aggression with other troublesome behaviors (e.g., Broidy et al., 2003; Joussemet et al., 2008; Tremblay, 2000). The present study aimed to address these concerns by examining the discriminant validity of physical aggression against nonaggressive forms of antisocial behavior in a sample of kindergartners. Furthermore, we evaluated the convergent validity of teacher reports of physical aggression using an age-appropriate screening measure.

Antisocial behavior is a complex and heterogeneous concept that encompasses a variety of behaviors such as lying, indifference, bullying, fighting, theft, vandalism and substance abuse. A major challenge is to unravel the heterogeneity of antisocial behavior and to identify different classifications. This is important as different problem behaviors, though substantially intercorrelated, appear to have different predictive value. Especially physical aggression appears worrisome and proves to be a key predictor of juvenile violence (Broidy et al., 2003; Cote et al., 2006; Loeber & Hay, 1997; Nagin & Tremblay, 1999; NICHD Early Child Care Research Network, 2004). Based on the current evidence in middle and late childhood, it is widely accepted that physical aggression (i.e., use of verbal threat and physical force to harm others or damage objects) is a distinct dimension of antisocial behavior that should not be confounded with other forms of antisocial behavior such as relational aggression (e.g., Crick & Grotpeter, 1995; Vaillancourt, Brendgen, Boivin, & Tremblay, 2003), and nonaggressive forms of antisocial behavior (Achenbach, Conners, Quay, Verhulst, & Howell, 1989; Frick et al., 1993; Loeber & Schmaleng, 1985a, 1985b; Quay, 1987; Tackett, Krueger, Sawyer, & Graetz, 2003).

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Physical aggression is associated with a wide range of concurrent and future adjustment problems, especially when it begins in early childhood (Cote et al., 2006; Joussemet et al., 2008; NICHD Early Child Care Research Network, 2004; Silver, Measelle, Armstrong, & Essex, 2005; Stipek & Miles, 2008; Tremblay, 2004). Severe problems are observed in both the social and cognitive domain, such as social rejection and academic underachievement (e.g., Dodge et al., 2003; Stipek & Miles, 2008). Moreover, about 4.4 to 16.6% of the young children persist in the use of physical aggression up to adolescence and adulthood (for a review, see Nagin & Tremblay, 2005). Early intervention is therefore crucial to counteract developmental trajectories of chronic aggression (e.g., Webster-Stratton, 1997). However, scholars have repeatedly notified that, for young children, physical aggression is often confounded with other forms of antisocial behaviors, which compromises predictive validity and the detection of children in need of intervention (Broidy et al., 2003; Joussemet et al., 2008; Tremblay, 2000). Moreover, rigorous tests of the assumption that physical aggression is distinctive of other troublesome disruptive behavior are sparse.

Recently, evidence was obtained for the discrimination of physical aggression from nonaggressive antisocial behaviors for kindergarten children (Spilt, Koomen, Thijs, Stoel, & Van der Leij, 2009). Nonaggressive antisocial behavior was described as behavior that violates social norms and that is potentially harmful to others but not physically or verbally abusive. Teacher reports of antisocial behavior were obtained using the Preschool Behavior Questionnaire (PBQ; Behar, 1977). This screening measure is specifically developed for young children and contains a heterogeneous pool of age-appropriate items of antisocial behavior. The checklist is easy to complete and widely used in international research including school-based studies (e.g., Drugli & Larsson, 2006; Goossens, Bokhorst, Bruinsma, & Van Bortel, 2002; Silver et al., 2005; Tremblay, Desmarais-Gervais, Gagnon, & Charlebois, 1987). The results of Spilt and colleagues (2009) showed that physical aggression could be distinguished from other troublesome behaviors, such as not sharing, blaming others, and showing sneaky behavior. The discrimination was tested and validated for both boys and girls using confirmatory factor analyses (CFA) in two large samples and further evidenced by differential associations with internalizing behavior and different outcomes with respect to gender differences in both mean levels and measurement issues

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(i.e., factorial invariance). It was suggested that a subset of items of the PBQ constitutes a subscale that could be used as a screening measure to obtain teacher reports of physical aggression (Spilt et al., 2009). Teachers are widely acknowledged as valuable sources of information on children's social-behavioral functioning, and especially their reports on dimensions of externalizing behavior show strong validity (Konold & Pianta, 2007). Given the vital role of teachers in the detection of at-risk children, it is crucial to evaluate the convergent validity of teacher measures of physical aggression that are specifically designed for young children.

A widely-used approach to evaluate convergent validity is the multi-trait multi-method model (MTMM; Campbell & Fiske, 1959). In this approach, trait and method factors are modeled to isolate trait variance from method or source variance and unique variance (i.e., random variance). Trait effects represent systematic variance in a latent variable associated with a particular latent trait. Method effects refer to systematic variance that is specific to a certain method or source. Convergent validity is evidenced by the amount of significant trait variance in the observed variables, whereas substantial method variance weakens the support for convergent validity. Furthermore, the MTMM model allows for an estimation of the true association between constructs since method variance is isolated from trait variance. The amount of trait covariance is an indicator of discriminant validity, which refers to the degree to which constructs are distinct. Thus, in addition to previous factor analytic research (Spilt et al., 2009), the MTMM approach offers an alternative way to test and confirm the distinctiveness of physical aggression from other nonaggressive-antisocial behavior problems.

The first goal of the current investigation was to provide further evidence for the separate assessment of physical aggression in young children by demonstrating discriminant validity in a behaviorally diverse sample of kindergartners. The second goal was to evaluate the convergent validity of teacher-reported physical aggression using PBQ items. Teacher ratings of physical aggression were evaluated against two alternative measures varying in source and/or method, which were teachers' free descriptions of children's social behavior and independent classroom observations. Based on previous research, we anticipated moderately large convergence between teacher ratings using the PBQ and teachers' free descriptions of physical aggression (cf. Thijs, Koomen,

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De Jong, Van der Leij, & Van Leeuwen, 2004). Modest convergence was predicted with ratings of independent observers (cf. Hoge, Meginbir, Khan, & Weatherall, 1985; Ostrov & Keating, 2004; Rubin, Moller, & Emptage, 1987). Furthermore, though we expected a substantially large amount of shared-trait variance between physical aggression and nonaggressive antisocial behavior since both represent dimensions of antisocial behavior, some degree of differentiation was anticipated based on research that has supported the distinctiveness of physical aggression from nonaggressive antisocial behavior (cf. Konold & Pianta, 2007; Spilt et al., 2009; Tackett et al., 2003).

### **3.2 Method**

#### *Participants*

The sample used for this study was part of an investigation into teachers' cognitions and practices toward children with different behavior profiles (Thijs, 2005). Data were available for 117 children from 39 kindergarten classrooms of regular elementary schools located in different rural and nonrural parts of the Netherlands. Written informed consent was obtained from the parents. Teachers ( $N = 39$ , two men) had reported on 858 children (414 girls) with a mean age of 67.5 months ( $SD = 8.4$ ). From each classroom, three children were selected with different behavior profiles, without teachers being informed about the selection criteria. The children were selected based on PBQ ratings relatively to their classmates. Children with the highest rating on Social Withdrawal but not above the mean on Externalizing Behavior were selected for the withdrawn subgroup. In contrast, children with the highest rating on Externalizing Behavior but not above the mean on Social Withdrawal and Internalizing Behavior were assigned to the externalizing subgroup. The average group consisted of children with scores close to but not above the class mean on these three scales. The withdrawn, externalizing, and average subgroup included 59.0%, 33.3%, and 69.2% girls, respectively. Considering the generally low prevalence of behavior problems in regular classrooms, with this selection procedure we guaranteed that children with a variety of behaviors were included in order to obtain an adequate sample for validation purposes.

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*Measures*

*Questionnaire.* The Preschool Behavior Questionnaire (PBQ; Behar, 1977) is a checklist that contains age-appropriate descriptions of behavior problems of young children. Items are rated on a 4-point Likert scale, ranging from 1 (*absolutely not characteristic*) to 4 (*very characteristic*). Teachers completed a Dutch version that has shown strong evidence of reliability and validity (Goossens, Dekker, Bruinsma, & De Ruyter, 2000). The Externalizing scale showed high internal consistency ( $\alpha \geq .91$ ), test-retest stability ( $r_s \geq .84$ ), and interrater agreement ( $\alpha = .91$ ) in a community and clinical sample. The validity has been supported by concurrent and predictive associations with parallel teacher-rated measures of adjustment, peer evaluations of aggression, and children's sociometric status (Goossens et al., 2002; Goossens et al., 2000). In addition, the scale has been shown to discriminate between a clinical and community sample (Goossens et al., 2000).

The Externalizing scale contains 14 items, including 8 items measuring antisocial behavior. The distinction between Physical Aggression (PA: 4 items: e.g., 'Kicks or hits' and 'Bullies') and Nonaggressive Antisocial Behavior (NAB: 4 items: e.g., 'Sneaky' and 'Blames others') has been supported by confirmatory factor analytic research in two independent samples of kindergarten boys and girls (Spilt et al., 2009). In the current study, both subscales showed high internal consistency ( $\alpha = .90$  and  $.88$ , respectively).

For selection of the target children, we used the broad-band scales for Externalizing and Internalizing behavior (15 items,  $\alpha = .89$ ), and the aggregated measure for Social Withdrawal (8 items,  $\alpha = .84$ ) containing the items of the subscales Social Inhibition (e.g., 'Shy or timid') and Solitary Behavior (e.g., 'Somewhat on his/her own'). Discriminant and convergent validity of those subscales has been established using a MTMM framework (Thijs et al., 2004).

*Classroom observations.* Videotapes were made during a natural small-group classroom activity that lasted on average 14 minutes ( $M = 14.2$ ;  $SD = 2.3$ ). The three selected children worked together on a large jigsaw puzzle in their classroom. Teachers were instructed to attend the activities as they were used to. Videotapes of the puzzle situation were coded for the occurrence of PA and NAB. Occurrences of antisocial behavior were scored only for those periods in which the teacher was absent.

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Observations of PA involved the frequency of verbal provocation, mean gestures, physical aggression, and object aggression. Observed nonaggressive forms of antisocial behavior included violations of social norms, such as not sharing or refusal to cooperate, and lying as well as ignorance or exclusion of other children, mean gestures or comments behind ones back, and blaming others. Total frequency counts were divided by the total number of observation minutes; thus final scores represented the rate of antisocial behavior per minute. The two independent observers who coded the videotapes were unaware of the children's behavior profile and study purposes. Intraclass correlations (ICC) for absolute agreement based on average measures were .90 and .89 for PA and NAB, respectively. Mean scores of the two observers were used in the analyses.

*Interviews.* Teachers were interviewed about each of the selected three children to obtain free descriptions of teachers about children's social behavior. In each interview, children were discussed in random order. An open-ended question was asked: "How would you describe the child's general social behavior, as compared to his/her age mates?" Teachers were asked to elaborate on their descriptions when these were unclear or short. The interviewer did not refer to the different dimensions of PA and NAB. Interviews were conducted by telephone and recorded on audiotape. They took place on average 5.29 weeks after the PBQ was completed ( $SD = 2.99$  weeks).

Four independent raters coded the teachers' answers. Raters were blind to the selection criteria and the study purposes. The rating form consisted of 7 items referring to problem behaviors, of which two represented PA and NAB that were used in the current study. In addition, 8 items addressed the presence of positive behaviors. Those latter items were added to circumvent raters to be exclusively focused on children's problem behaviors. Items were rated on a 4-point Likert scale, ranging from 1 (*not characteristic at all*) to 4 (*very characteristic*). ICCs for consistency in agreement based on average measures were .80 and .61 for physical aggression and nonaggressive antisocial behavior, respectively. Mean scores of the four raters were utilized in the analyses.

*Statistical analyses*

The MTMM model was estimated by means of confirmatory factor analysis (CFA) using the Mplus program (Muthén & Muthén, 1998-2005). Analyses were

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conducted on the observed data under the assumption of Missing At Random (MAR). To account for the non-independence and the non-normal distribution of the data, the robust maximum likelihood method MLR was performed. The MLR chi-square test statistic was used to evaluate overall model fit, also referred to as the Yuan-Bentler chi-square statistic (Muthén & Muthén, 1998-2004). Additional fit indexes were examined because the chi-square is highly sensitive to sample size. The model fit is considered acceptable when  $CFI \geq .95$ ,  $SRMR \leq .08$ , and  $RMSEA \leq .06$  (Hu & Bentler, 1999). Because the Yuan-Bentler chi-square cannot be used for difference testing of nested models, the Satorra-Bentler scaled chi-square difference test was used (Satorra & Bentler, 2001)

### **3.3 Results**

*Preliminary analyses*

Ten cases with extreme scores ( $z$ -scores  $\geq 2$ ) were detected in the observations of Physical Aggression (PA) or Nonaggressive Antisocial Behavior (NAB). Close examination of these cases provided several possible explanations that could account for the extreme ratings. During the observation in each class, the three target children worked together as a small group. Extreme scores were mostly given to children within the same small group. In one group, the teacher did not attend for a relatively long period of 10 minutes. Physical fighting escalated during this time resulting in extreme ratings for all three children, whereas in other groups no such substantial fights were observed. In another group in which extreme scores were observed, four instead of three children were working together. In addition, one child received a high rating on physical aggression because the child was excessively throwing with material. Notably, extreme scores were observed across all children independent of children's behavioral profiles. These 10 cases were considered univariate outliers and excluded from subsequent analyses.

*Descriptive statistics*

Table 1 presents the descriptive statistics of the study variables. Substantial variance was observed for all variables. The association between PA and NAB

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varied across measurement methods. A high correlation was found for teachers' questionnaire reports, whereas ratings obtained from interviews and observations yielded a mediocre and modest correlation, respectively. Teachers' questionnaire reports of PA were related to interview ratings of both PA and NAB, but seemed somewhat stronger associated with interview PA than NAB. In addition, teachers' questionnaire reports of PA were positively correlated with observed PA, whereas the correlation with observed NAB did not reach traditional levels of significance. All correlations were in the expected directions.

*Table 1 Zero-order correlation matrix with means and standard deviations (N=107)*

Measured variables	<i>M</i>	<i>SD</i>	1	2	3	4	5	6
<i>Questionnaire</i>								
1. Physical aggression	1.30	0.53	-	.77**	.58**	.44**	.19*	.14
2. Nonaggressive antisocial	1.48	0.72		-	.52**	.52**	.12	.20*
<i>Interview</i>								
3. Physical aggression	1.30	0.50			-	.45**	.21*	.06
4. Nonaggressive antisocial	1.21	0.39				-	.09	.09
<i>Observation</i>								
5. Physical aggression <sup>a</sup>	0.37	0.29					-	.31**
6. Nonaggressive antisocial <sup>a</sup>	0.07	0.10						-

*Note 1: \*p < .05, \*\* p < .01 (one-tailed)*

*Note 2: <sup>a</sup>= rate per minute*

*Multi-trait multi-method model*

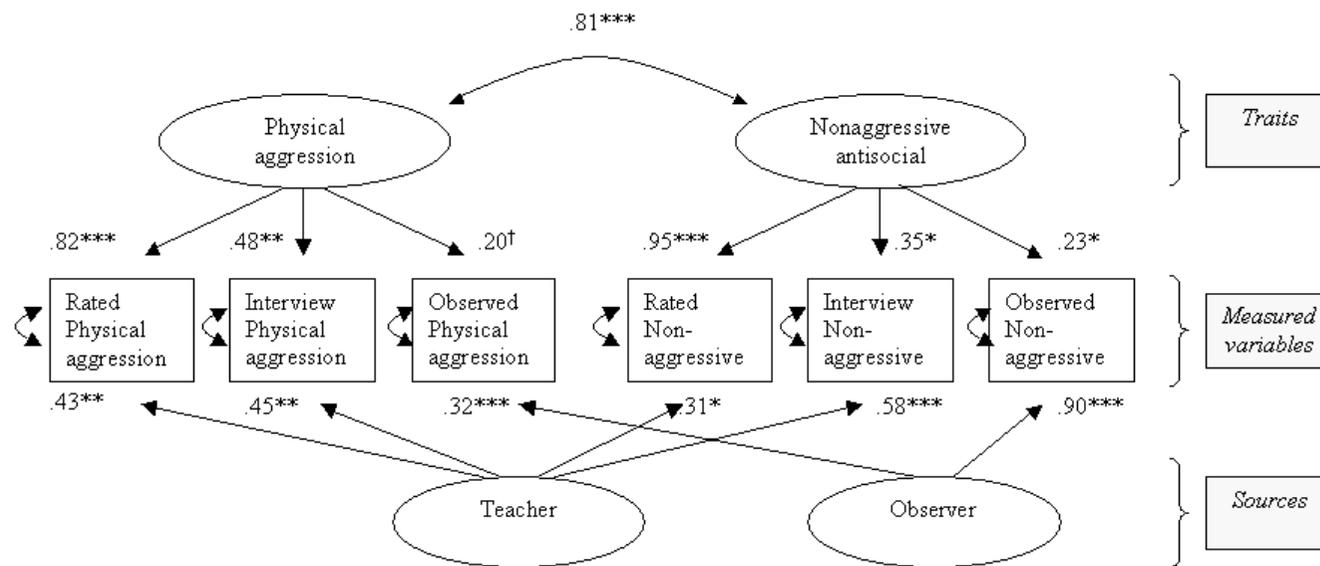
Several nested models were evaluated using the Satorra-Bentler chi-square test, starting with a model without method factors. Method factors were specified to be uncorrelated with the other factors in the model. To retain degrees of freedom, the method effects were constrained to be equal for all variables measured by the same method. Note that the error variances were not constrained resulting in unequal standardized loadings.

The final most parsimonious model presented in Figure 1 contained two trait and two method factors. The two method factors represented unique source variance (i.e., teacher and independent observer). The fit of this model was good:

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$\chi^2 (6, N = 107) = 3.28, p > .10$ ; RMSEA = .00; SRMR = .03; CFI = 1.00, and significantly better than a model without method factors:  $\Delta\chi^2 = 12.88, \Delta df = 2, p < .001$ . In addition, a two-trait model with three method factors (independent observation, teacher-questionnaire, and teacher-interview with the latter two allowed to be correlated) did not provide a better fit to the data than the final model:  $\Delta\chi^2 = .20, \Delta df = 2, p > .10$ .

Figure 1 Multi-trait multi-method model with standardized estimates



Note:  $*p < .05$ ,  $**p < .01$ ,  $***p < .001$ ,  $^{\dagger}p = .065$  (one-tailed)

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*Discriminant validity.* The covariance between PA and NAB was reasonably high with 65.6% shared-trait variance. To provide a more stringent test of the distinctiveness of the traits, the final model was compared to a similar model with one trait factor. This latter model fitted the data significantly worse ( $\Delta\chi^2 = 9.40$ ,  $\Delta df = 1$ ,  $p < .01$ ).

*Convergent validity.* Marginally to strongly significant trait variance was observed in the measures of PA, providing support for convergence among different methods and sources. Teacher-questionnaire reports showed large trait variance, while teacher interviews showed moderately large trait variance. Observer ratings contained modest trait variance that was marginally significant.

*Method effects.* All measures demonstrated the presence of method effects. In support of convergent validity, method effects in teacher-questionnaire reports of PA and NAB were substantially smaller than trait effects. In teacher interviews and observer ratings of PA and NAB, equally large or larger method effects were observed in comparison to trait effects.

### **3.4 Discussion**

The distinctiveness of physical aggression from other antisocial behavior is widely accepted but little research has explicitly focused on young children to empirically test this assumption. In addition, scholars have repeatedly notified that, in early childhood, physical aggression is often confounded with other forms of antisocial behaviors (e.g., Broidy et al., 2003; Joussemet et al., 2008; Tremblay, 2000). This study addressed these concerns in two important ways. First, using the MTMM approach, the discriminant validity of physical aggression against nonaggressive antisocial behavior could be largely confirmed in a behaviorally-diverse sample of kindergartners. Second, the convergent validity of teacher reports of physical aggression on the PBQ was supported.

In the current study, assessments of physical aggression and nonaggressive antisocial behavior were obtained using three measures that differed in method and/or source. In the MTMM approach, method and/or source effects are isolated such that true relations among traits can be estimated. A considerable between-trait association between physical aggression and nonaggressive antisocial

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behavior was found. This is not surprising because the constructs represent dimensions of the same higher-order construct of antisocial behavior. Differences in antisocial strategies may be subtle and not easily observable for teachers. Also, problems tend to co-occur and many aggressive children are likely to use other forms of antisocial behavior at times as well. For comparison, a between-trait correlation of .88 was found between the subscales Delinquency and Aggression of the Child Behavior Checklist (CBCL/4-18; Achenbach & Rescorla, 2000) in a multitrait-multisource design (Konold & Pianta, 2007). Importantly, the overlap between physical aggression and nonaggressive antisocial behavior was not complete. The estimation of 34.4% of unique trait variance indicates some differentiation as well. Moreover, the difference test between a one-trait and two-trait model offered a more stringent check of the distinctiveness of the traits and supported the uniqueness of the constructs. This finding converges with previous research using confirmatory factor analysis in a large sample of kindergartners (Spilt et al., 2009). The divergence between the two may be embedded in differences in etiology and risk factors such as parental traits and psychopathology, parenting skills and monitoring, stability, and heritability (Eley, Lichtenstein, & Stevenson, 1999; Monuteaux, Fitzmaurice, Blacker, Buka, & Biederman, 2004; Nigg & Hinshaw, 1998; Patrick, Snyder, Schrepferman, & Snyder, 2005; Stanger, Achenbach, & Verhulst, 1997). Moreover, physical aggression could lead to different developmental outcomes. Prospective research indicated that physically aggressive children especially are at at-risk of juvenile violence (e.g., Nagin & Tremblay, 1999; NICHD Early Child Care Research Network, 2004), whereas nonaggressive antisocial behavior appeared more predictive of nonviolent delinquency (Nagin & Tremblay, 1999). Together with the current results, these findings emphasize that the distinctiveness of physical aggression from more generic antisocial behavior, though moderate, should not be ignored.

Support was found for the convergent validity of teacher reports of physical aggression using the PBQ. Teachers' reports of physical aggression on the PBQ contained a relatively small amount of source variance in comparison to trait variance. As predicted, moderately large convergence was found with teachers' free descriptions of children's social behavior (cf. Thijs et al., 2004). Also in line with our expectations and previous research, modest teacher-observer

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convergence was found (e.g., McNeilly-Choque, Hart, Robinson, Nelson, & Olsen, 1996). It should be considered that the discrepancy between observer and teacher ratings may not simply represent 'noise' but is also likely to reflect true differences that result from the situation in which the judgments are made. Teachers' judgments were rooted in many daily observations and interactions with the children across various situations and school contexts. In contrast, observer ratings were restricted to occurrences of children's antisocial behavior in a specific small-group peer situation when the teacher was not present as well as to a limited time frame (Ladd & Profilet, 1996; Lakes & Hoyt, 2008). Notwithstanding the divergence, the results do suggest that teacher ratings of physical aggression are to some extent related to children's actual use of aggressive strategies, as has been found in other observational studies (McEvoy, Estrem, Rodriguez, & Olson, 2003; McNeilly-Choque et al., 1996; Ostrov & Keating, 2004).

Several qualifications of the study should be considered. Data were obtained in a behaviorally diverse subsample of kindergarten children, which limits the generalizability to other populations. Analyses in more homogeneous or randomly selected samples could have yielded different results. Furthermore, although the number of participants against the number of free parameters exceeded the ratio 5:1, a larger sample is recommended under conditions of nonnormality (Bentler & Chou, 1987). A larger sample size is also needed to take into account measurement invariance across gender in teacher ratings of PA (cf. Spilt et al., 2009). Lastly, although the observations were conducted in a natural activity in the classroom supporting the ecological validity, the observations were restricted to one small-group activity and generalizability to other situations may be low (Lakes & Hoyt, 2008). The specific peer context may have affected children's use of aggression. Multiple observations capturing behavior across school activities (e.g., free play) are needed to obtain more valid ratings that most likely will demonstrate stronger convergence with teacher reports.

For school psychologists, teachers are an imperative source of information on children's social-behavioral functioning. It is therefore crucially important that teacher measures routinely undergo critical evaluation. The current study addressed the repeated call of scholars for a screening strategy focused on physical aggression rather than more generic antisocial behavior. The results

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provide strong support for the use of the PBQ as a brief screening measure to obtain information from teachers about young children's physically aggressive behavior. Note that the scale is not developed for diagnostic use as most brief screeners often show less validity than more comprehensive measures intended for clinical assessment (Hill & Hughes, 2007). Furthermore, practitioners are urged to employ multiple sources and assess physical aggression in the context of other key variables such as family adversity (e.g., Patrick et al., 2005). Lastly, it may be noted that the PBQ offers an additional appealing feature with respect to the assessment of internalizing behavior, as it comprises different subscales that represent developmentally-relevant dimensions of social withdrawal in young children (Coplan & Armer, 2007; Thijs et al., 2004).

In conclusion, the present study evaluated the convergent and discriminant validity of teacher reports of physical aggression using an age-appropriate measure for young children derived from the Preschool Behavior Questionnaire (PBQ). Support was found for the separate assessment of physical aggression from more nonaggressive antisocial behavior. Convergent validity was evidenced by the finding of substantially more trait than source and method variance in teacher reports of physical aggression.

